Patent claims

1. Multiturn angle measuring device (1) with a first dimensional standard (9), which is non-rotatably connected to an input shaft (2) and which is sampled with a first scanning unit (10) to determine an angular position of the input shaft (2), and with additional dimensional standards (11, 12, 13) that measure the number of turns of the input shaft (2), each additional dimensional standard (11, 12, 13) being reduced in speed by means of a reduction gearing from the preceding dimensional standard (9, 11, 12) arranged in parallel to each other, and a scanning device (21, 22, 23) for the sampling of each dimensional standard (11, 12, 13) arranged on a circuit board (6), wherein the input gear (40) connected to the input shaft (2) and the first transmission gear (41) have axes of rotation (D_{40}, D_{41}) that are not parallel to each other, flanks of teeth (Z_{40}, Z_{41}) of the input gear (40) and of a wheel (411) of the first transmission gear (41) are not parallel to the axis of input rotation (D_{40}, D_{41}) of the respective gears (40, 41), a number of teeth (Z_{40}) of the input gear (40) is smaller than a number of teeth (Z_{41}) of the wheel (411) of the first transmission gear (41), the following transmission gears are arranged parallel to the input shaft, and a pinion (412) of the first transmission gear (41) and the wheel of a second transmission gear (31) have helical gears.

2. Multiturn angle measuring device according to claim 1, wherein the input gear (40) connected to the input shaft (2) and the wheel (411) of the first transmission gear (41) have helical gears.

3. Multiturn angle measuring device according to one of the preceding claims, wherein the scanning unit (10) for the first dimensional standard (9) and the scanning units (21, 22, 23) of the additional dimensional standards (11, 12, 13) are arranged on a single circuit board (6).

4. Multiturn angle measuring device according to one of the preceding claims, wherein the additional dimensional standards (11, 12, 13) are centrally carried by main gears (31, 32, 33) that have axes of rotation parallel to the input shaft (2) and driven via additional intermediate gears (34, 35) are arranged between the main gears, and wherein the gears (31, 32, 33, 34, 35, 41) are arranged on a single-piece multiturn unit (5).

5. Multiturn angle measuring device according to one of the preceding claims, wherein the other dimensional standards (11, 12, 13) comprise diametrically magnetized permanent magnets.

6. Multiturn angle measuring device according to one of the preceding claims, wherein the first dimensional standard (9) is a transmissive Moiré code disk, which is illuminated by a transmitter (7) and which is detected by a photoelectric scanning unit (10).

7. Multiturn angle measuring device according to one of the preceding claims 1 to 6, wherein the first dimensional standard (9) comprises one or more magnets, which are magnetized in sectors and detected by one or more magnetic sensors.